Smart Safety:
More data means more safety

Dräger

Technology for Life

Digital gas monitoring with IoT platforms or automated device management via cloud software are potential milestones on the path to digitalising safety processes and generating new knowledge. Today, networked hardware systems and data platforms already offer greater transparency regarding the condition of industrial plants and workplaces. These and other Smart Safety solutions can ensure safe, transparent, and efficient operations in the raw materials and process industries.

Smart Safety

Digitalised safety processes around networked gas measurement technology

When operating the lime shaft kilns of Fels-Werke GmbH, centuries-old material knowledge and future technology come together in lime burning. This production of calcium oxide (CaO) has been known since ancient times and has been developed further ever since. In this process, calcium carbonate (CaCO3) in the form of limestone is heated to around 1,000 degrees Celsius by a solid, liquid, or gaseous fuel. This produces quicklime, which becomes slaked lime (Ca(OH)2) when slaked with water. It then sets during processing to form calcium carbonate. Today, various building materials and industrial raw materials are produced using refined processes in state-of-the-art production facilities. The portfolio of Fels-Werke includes white lime, fine white lime, white hydrated lime, milk of lime, and various special limes as burnt products. During the production of these materials, mobile gas measuring devices ensure a high level of occupational safety.

Asset Management with cloud software
Dräger Gas Detection Connect

Founded 85 years ago as “Stein und Erden GmbH”, the company based in Goslar, Germany, has undertaken a digital transformation since 2021. Fels-Werke uses the cloud-based software solution Gas Detection Connect from Dräger to manage its fleet of gas detection devices.

The term Smart Safety is used to describe **the digitalisation of safety-relevant processes and tasks**. It is fundamentally based on the availability of a wide range of data, which becomes a valuable knowledge advantage in business operations. Innovative services relating to measuring technology, protective equipment, and accessories create added value and relief for users based on device data, sensor values, image and map material, or local information. Predictive maintenance (anticipating maintenance needs and avoiding spontaneous wear and failures) is often the goal of data collection and analysis. Companies in all industries can increase their economic and ecological sustainability by means of fully digitalised processes through networked systems.

Thomas Ullrich confirms this when he reports on his daily dealings with Dräger gas detection technology. As a measurement technician at Fels-Werke, he is responsible for a fleet of around 150 Dräger gas detection devices and X-dock test stations spread across six sites. This inventory has been managed with Gas Detection Connect since last year. Previously, the devices were monitored using Dräger’s classic X-dock Management software. “Even with this system, it was possible to see within seconds that an employee had used the gas detection device on a particular mission, that it had been tested beforehand, and that it was ready for use,” says Ullrich.

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Cloud software provides relief

With the introduction of **Dräger Gas Detection Connect**, Fels-Werke has now opted for the next level of digitisation in the management of gas measurement technology. “The software has disappeared from computers, and the devices are always kept up to date via the cloud with its database,” says the specialist, describing the advantages for his everyday work. Ullrich, as the user, is not the only one who has drawn a positive conclusion, as the customer’s IT department is also satisfied due to steps previously required to update the firmware via a local server now being automated. In addition, calibration dates and maintenance requirements, triggered alarms, and device status are documented clearly, in detail, and can be viewed by those authorised from anywhere.

Cloud solutions are not yet standard in the industry, although in terms of cybersecurity and data security they are in no way inferior to software installed on site. Within its own group, Fels-Werke, which is part of CRH (see page 9), is setting a new benchmark. The benefits are particularly evident in higher-level processes which include testing, maintenance, and management of equipment. “For our customer, centralised control and centralisation of firmware updates using the X-dock stations were crucial in this project due to the geographically widely distributed locations,” says Sonja During, a Dräger sales engineer who accompanied the introduction of Gas Detection Connect at Fels-Werke. The improved resource planning ensures optimum availability of well-maintained equipment, which is also interesting for other producers, she explains. “Digitally networked gas detection technology will play a decisive role in the industry in the future,” predicts the graduate chemist. The aim, she says, is to further increase safety using real-time data.

“In our five open-pit operations where limestone is mined, gases are usually not a problem,” says Ullrich. “Much more important is the continuous monitoring of the atmosphere during further processing in the 37 operating lime shaft kilns.” These plants are operated in continuous combustion. As long as they are glowing, gas measurement technology is essential, especially to protect workers from carbon monoxide, which is continuously monitored using Dräger Pac single-gas warning devices. “Without these devices, no one is allowed to enter the gout – which is what we call the upper part of the shaft furnace,” explains Ullrich.

Fels-Werke also uses the highly valued multi-gas measuring devices from the Dräger X-am series. They are used to control emissions and for clear measurement. These devices support Ullrich in his pre-regulatory measurements and are equipped for Fels-Werke GmbH with sensors for detecting oxygen (O_2), carbon monoxide (CO), carbon dioxide (CO_2), and methane (CH_4).

Go beyond safety standards

The gas measuring devices at Fels-Werke are tested not only every working day, but before each individual operation. “In this way, we exceed the standards in Germany for the use of gas detection devices for workplace safety.” This corporate decision is a real plus for work-place safety, which is facilitated by connectable test stations with digital infrastructure.

A total of eight Dräger docking stations and suitable test gases are available at Fels-Werke for the so-called bump tests. The stations also transmit the data loggers of all mobile gas detectors and the results of the tests to the cloud software via an existing network. Conversely, they automatically upload updates to the device software (firmware). The required documentation of all tests, including the data loggers of the devices, is carried out digitally and is available to every user at any time. Independently of the networked X-dock stations, the measured value and location can be transferred to the cloud while using the measuring devices in conjunction with a smartphone (see below).

The X-dock stations themselves also obtain their own firmware updates from the cloud software Gas Detection Connect at the touch of a button so that the 15-minute update does not interrupt business operations. In the traditional process, an employee had to travel to each site for necessary updates. Today, only the test gas cylinders need to be replaced manually by the qualified employees.

Workplace monitoring with digital live monitoring

If the digital management of the measuring device fleet represents a quality leap in the management of the technology, the Smart Safety portfolio with its live monitoring systems leads to a significant increase in safety. Gas measuring devices are coupled via Bluetooth with an explosion-proof smartphone to allow the monitoring of a variant, a gas, and a contamination with the Gas Detection Connect software. Depending on the operational regulations, this sends data such as measured values, GPS coordinates, alarms and, if desired, the name of the device wearer to the cloud via a mobile app. The advantage is that if an alarm is triggered, it is recorded in real time in the control room, in the gas protection system, in the mine or plant fire department and is visualised on a map. In this way, gas occurrences, leaks, incidents, workplace pollution, and contamination can be quickly evaluated and automatically documented by all relevant individuals. In an emergency, action can be taken quickly and safely.

„When data is available in the associated, local context, it helps to make better decisions in a variety of situations," says Sven Schmellenkamp, a business developer at Dräger Germany who heads a strategic Smart Safety Incubator as well as a technological Systems Centre to meet customer needs around digitalisation. Dräger is always identifying new applications for data-based services, explains Schmellenkamp. This often involves strengthening time and personnel efficiency during preventive safety measures in complex industrial processes and plants, so that value-adding processes are delayed or impaired as little as possible.

Schmellenkamp gives three examples:

- Before starting work, a smart tracking system independently checks the readiness of the personal gas detector. The employee is automatically informed about the status of their device and can enter the plant without worry.
- The employee's location information, the sensor equipment of the device, and the information stored in the database about the plant to be entered can be linked together. The smart system then automatically checks whether the sensor technology carried matches the safety requirements of the plant.
- The analysis of data volumes collected over defined periods of time is used to identify anomalies and display them in so-called heat maps.

Focus on service

Smart Safety is more than just the sum of hardware and software. It is, in fact, a new strategy of diving into a co-creation mode with customers. “Our systems have to be maximally flexible,” says Schmellenkamp. “It’s not the customer who has to adapt to our solution, but the solution is designed together with the customer,” he emphasises.

The range of these needs is wide, from the significant scaling of workloads for measures such as turnarounds to the long-term, secure documentation of activities. The former example is a good illustration of Smart Safety’s potential even in special situations. When for a few weeks the number of workers in a plant increases more than tenfold, efficient and safe processes for rental, management, and testing of measurement equipment are particularly valuable. The second example reflects the increasing importance to companies of being able to prove that they have worked safely, as many industrial companies want to actively document this fact. This can extend to the automatic documentation of personalised hazardous substance exposures of their own workers and service providers.

Moving into the future requires a first step

It is undisputed that smart safety systems, automated processes, and autonomous technologies will have a significant impact on the future of all industries. More and more companies are looking for methods to make the working world and their own production safer, more efficient, and more sustainable. If you want to go down this path, you must take the first step, just as Fels-Werke GmbH did in 2021-2022 with the introduction of Gas Detection Connect.

X-node, wireless IoT device monitoring gases and air quality

Internet of Things thanks to LoRa network

A new monitoring device, the **Dräger X-node**, sends continuous measured values such as gas occurrence, humidity, air pressure, and temperature to an Internet-of-Things platform (IoT platform). Clear online dashboards provide permanent information about a working environment. The smart, wireless device can be suspended where the risk of a gas occurrence has been identified. A powerful battery and sensitive sensor technology from stationary gas warning technology allow for months of maintenance-free area monitoring. The data is radioed via Bluetooth to a smartphone app or via LoRa-Wan (Long Range Wide Area Network), an energy-efficient network, to a data platform. In addition to pure documentation and monitoring, this data can be used to influence or control other IoT systems and, for example, activate automatic ventilation systems, air conditioning, or cleaning mechanisms.

Dräger Gas Detection Connect

With the cloud-based software Gas Detection Connect, Dräger has developed a powerful digital platform for gas detection technology. The core objectives were the efficient networking of the hardware and the comprehensive use and contextualisation of the data. Information ranging from individual gas readings and test results to certificates are transmitted via Dräger X-dock stations. The Dräger Rental Robot 3.0 rental station with web-based front end and IoT adapter can also be connected to the system. This adds another layer of information to digital fleet management.

Data protection was a priority during software development. All data is backed up in the European Microsoft Azure Cloud. By clearly assigning roles and rights, the user can decide which employees can view what data. For example, it can be set whether the GPS position of employees is visible on a map display and whether their names should be displayed anonymously.

Dräger Gas Detection Connect has been consistently designed for user-friendliness. Commissioning and updates require no support from the IT department, as all applications are web-based. Those who purchase the licence receive hosting of the data, regular software updates, and support. Dräger is thus successfully implementing the concept of Software-as-a-Service (SaaS) in Smart Safety.

Fels-Werke GmbH

The company, which specialises in limestone quarrying and the manufacture of lime and limestone products, is based in Goslar, Germany. It belongs to the globally active Cement Roadstone Holding plc (CRH) in Ireland. In Germany, Fels-Werke GmbH operates six lime plants, one dolomite plant, and one mortar plant. In addition, there is a lime plant in the Czech Republic. In Germany alone, the company produces around 5 million tons of lime and limestone annually for a wide range of applications. The annual capacity of the kilns is around 2 million tons. The kilns are operated at temperatures between 900 and 1,200 degrees Celsius using various fuels.

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